Original Report

Prevalence, Burden, and Control of Syphilis in Haiti's Rural Artibonite Region

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ABSTRACT

Objectives: A study was conducted to determine the prevalence and health consequences of syphilis and to evaluate existing control measures in a Haitian rural district of 200,000 people served by 12 community dispensaries and Hospital Albert Schweitzer.

Methods: Syphilis seroprevalence among consecutive women receiving antenatal services was assessed using rapid plasma reagin (RPR) screening and fluorescent treponemal antibody absorption (FTA-ABS) confirmatory testing. Hospital and dispensary records were used to review genital ulcer disease and syphilis cases seen during 1995.

Results: Of 811 pregnant women attending prenatal clinics during a 3-month period in 1996, 46 (5.7%) were RPR reactive. Syphilis seroreactivity was confirmed in 45 (97.8%) of 46 samples by FTA-ABS. Of 649 women attending dispensaries in the valley 41 (6.3%) were syphilis seroreactive compared with 4 (2.5%) of 162 women attending dispensaries in the mountains (OR = 2.66; P = 0.056). In 1995, 620 cases of genital ulcer disease were seen at the community dispensaries. At the central hospital, 257 new diagnoses of syphilis were made in 1995, including 30 cases of primary and secondary syphilis, 168 cases of latent disease, 17 cases of recurrent infection, 9 cases of tertiary disease, and 33 cases of congenital syphilis.

Conclusions: The 33 cases of congenital syphilis, a rate of 550 cases for 100,000 live births, clearly demonstrated a failure of local control measures. Decentralized prenatal screening for syphilis, same-day treatment of seroreactors, and strengthened partner treatment were initiated. Further studies to improve primary prevention of syphilis in rural populations have been started. Other strategies, including mass treatment of high-risk groups, should be investigated.

Key Words: *antenatal women, congenital, genital ulcers, Haiti, syphilis*

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Haiti, on the western third of the island of Hispaniola, has played an interesting role in the long history of syphilis. Some medical historians have postulated that Columbus' crew contracted syphilis during their adventures on the island of Hispaniola in 1492 and introduced the disease to Europe upon their return.[1] Some 500 years later this small Caribbean island was unjustly blamed for another deadly sexually transmitted disease (STD) epidemic, caused by the human immunodeficiency virus (HIV).[2] Despite this historic role, few current data exist on syphilis in Haiti, except for prevalence rates from urban centers. For instance, one study conducted in Cité Soleil in 1995 found that 110 (11%) of 996 pregnant women were syphilis seroreactive.[3]

The rural Hospital Albert Schweitzer (HAS) district is composed of seven zones in the Artibonite valley and five zones in the surrounding mountains. The hospital serves as a referral center for the entire district of about 200,000 people. A dispensary staffed by a health auxiliary provides basic primary care for the ten to twenty thousand inhabitants of each rural zone. Approximately 7000 pregnancies occur annually in the HAS district, and it is estimated that 80% of pregnant women seek prenatal care at a dispensary. All women deliver at home with a traditional birth attendant; only complicated deliveries come to HAS. Prior to this study, blood was collected from women having their first prenatal visits at local dispensaries and sent to the hospital laboratory for a rapid plasma reagin test (RPR). Treatment of seroreactive women was given at follow-up appointments at the local dispensaries. Besides serologic screening of asymptomatic patients, especially of pregnant women, syphilis cases were detected through clinical diagnosis of symptomatic patients and through partner notification of index cases. To assess the prevalence and health consequences of syphilis in a rural Haitian region, and to evaluate current strategies of syphilis control, a study was conducted at HAS.

METHODS

Syphilis Seroprevalence in Pregnant Women

Five dispensaries were chosen to participate in this study: two of the five mountain clinics, and three of the seven

valley clinics. In this way a representative sample of women from the HAS district could be sampled. All women attending their first prenatal consultation for the current pregnancy were included in the study. Blood was drawn for syphilis serology at the local dispensaries. Sera were separated and sent to the central HAS laboratory for testing using rapid plasma reagin (Becton Dickinson, Sparks, MD), following the manufacturer's instructions. Results of RPR testing were sent back to the dispensary and the women were treated if necessary at a follow-up appointment. Sera were frozen at -20°C for confirmatory testing. All positive samples were tested by fluorescent treponemal antibody absorption testing (FTA-ABS, Becton Dickinson, Sparks, MD) at the Cornell-GHESKIO laboratory in Port-au-Prince.

Review of Cases of Genital Ulcer Disease Seen at the Dispensaries

At the rural dispensaries, the patient registers with patients' sex and diagnosis were reviewed. Patients with STDs were classified by clinical syndrome and not by specific diagnosis, and all genital ulcers were reported as "genital ulcer disease (GUD)." The number and gender of patients with new cases of genital ulcer disease seen in the dispensaries in 1995 was determined.

Review of Hospital Cases of Syphilis

All syphilis cases diagnosed in 1995 were reviewed. Cases were detected using two approaches. First, the computerized hospital register of all new diagnoses was consulted. A list of all new cases of syphilis for 1995 was generated from this register and patient charts were reviewed. Second, the HAS laboratory log book of all RPR testing with patient names and chart numbers was reviewed. All charts of patients with a positive RPR were examined. Only patients with a new diagnosis of syphilis in 1995 and who resided in the HAS district were included in this study.

New cases were classified into six stages: primary, secondary, latent, recurrent, tertiary, or congenital. Primary, secondary, and tertiary were classified according to standard serologic and clinical criteria.[4] Because of the unreliability of patient histories, no attempt was made to distinguish early latent from late latent syphilis, but rather all asymptomatic patients with positive syphilis serology were placed into one group. Cases were considered recurrent disease when patients' charts showed a fourfold RPR titer increase after treatment, or when the initial titer was greater than 1:16 and failed to fall fourfold at 6-month follow-up for primary and secondary syphilis, or at 1 year for latent syphilis. Recurrent disease, therefore, includes both patients with treatment failure and patients with reinfection. Congenital syphilis was classified according to the Centers for Disease Control and Prevention (CDC) clinical and serologic criteria for presumptive diagnosis of congenital syphilis.[5]

Charts of pregnant women who were RPR reactive were reviewed to determine the treatment that they had received. Adequate treatment for a pregnant woman was defined as benzathine penicillin 2.4 million units intramuscularly repeated at weekly intervals for a total of three injections. Inadequate therapy was less than three injections.[6]

Serum HIV antibodies were detected by enzyme-linked immunosorbent assay (ELISA) (Abbott Diagnostics, Abbott Park, IL), using manufacturer's recommended techniques. Sera repeatedly reactive by ELISA were considered positive. The specificity of ELISA testing for HIV at HAS was recently documented: of 535 patients tested, 112 were reactive by ELISA, and all 112 were confirmed by Western blot.[7]

RESULTS

Syphilis Seroprevalence in Pregnant Women

The study was conducted between September 1, 1996, and December 1, 1996. Of 811 pregnant women, 46 (5.7%) were RPR reactive. Of the 46 RPR reactive sera, 45 (97.8%) were confirmed by FTA-ABS. Of 649 women attending dispensaries in the valley, 41 (6.3%) were syphilis seroreactive compared with 4 (2.5%) of 162 women attending dispensaries in the mountains (OR = 2.66; P = 0.056) (Table 1).

Review of Cases of Genital Ulcer Disease Seen in Rural Dispensaries

In 1995, 620 cases of genital ulcer disease were seen in the rural HAS district dispensaries and 527 (85%) of these cases were men.

Review of Hospital Cases of Syphilis

Review of HAS clinical registers and laboratory records resulted in the identification of 383 cases of syphilis. Eighteen (4.7%) charts could not be found. Of the 365 charts that were reviewed, 257 (70.4%) were syphilis cases from the HAS district diagnosed in 1995 (Table 2). The other 108 (29.6%) were excluded from this study either because they were not from the HAS district or because the initial diagnosis of syphilis was made prior to 1995.

Table 1. Syphilis Seroprevalence in Women Attending Rural Haitian Antenatal Clinics

Type of Rural Zone	*Number of Dispensaries (n = 5)*	*Number of Women Tested (n = 811)*	*Number Seropositive for Syphilis (n = 45)*	*Percentage Seropositive for Syphilis (%)*
Mountain	2	162	4	2.5
Valley	3	649	41	6.3

Table 2. Syphilis Cases Diagnosed at Hospital Albert Schweitzer in 1995

Stage	*Adult Men (n = 102)*	*Adult Women (n = 122)*	*Total (n = 257) (%)*
Primary	16	0	16 (6.2)
Secondary	10	4	14 (5.4)
Latent	63	105	168 (65.4)
Recurrent	5	12	17 (6.6)
Tertiary	8	1	9 (3.5)
Congenital	—	—	33 (12.8)

Asymptomatic patients were screened for syphilis for several reasons. Of the 168 cases of latent syphilis detected, 42 (25.0%) patients were screened for a history of HIV, 34 (20.2%) were pregnant women, 24 (14.3%) were parents of children with congenital syphilis, 17 (10.1%) were patients with a nonulcerative STD, 13 (7.7%) were sexual partners of cases previously diagnosed at the hospital. The remaining 38 (22.6%) were screened for a variety of other reasons.

Of the nine cases of tertiary syphilis, three were diagnosed with cardiovascular syphilis, and six with neurosyphilis. There were four cases of tabes dorsalis, one case of general paresis, and one case of meningovascular syphilis in a 30-year-old man with HIV.

Of the 33 cases of congenital syphilis, 12 (36.4%) were stillbirths born to women with a positive RPR who had received no treatment prior to delivery. Twenty-one (63.6%) cases were clinically symptomatic neonates brought to the hospital after home delivery, of whom five (23.8%) died during their hospitalization. The total mortality from congenital syphilis was 17 of 33 cases (51.5%).

Of the 257 patients from the HAS district diagnosed with syphilis in 1995, 79 (30.7%) were HIV seropositive. Of 34 syphilis seroreactive pregnant women, 6 (17.6%) were HIV positive. Eight (26.7%) of 30 patients with primary or secondary syphilis had HIV antibodies. There were 17 recurrent cases of syphilis of whom 12 (70.6%) had HIV disease. Of the nine cases of tertiary syphilis, only one (11.1%) was HIV positive.

Thirteen (38.2%) of the 34 pregnant women with reactive RPRs received adequate treatment, 7 (20.6%) received inadequate treatment, and 14 (41.2%) received no treatment. A health worker searched for all of the women who received less than adequate treatment and found that the majority of them lived a many hours' walk distant from the hospital and had failed to return for follow-up appointments.

DISCUSSION

The data presented in this report show that syphilis is a significant public health problem in this part of rural Haiti. The treponemal seroprevalence among pregnant women was 5.5%. It is unlikely that the reactive serologies were due to nonsyphilitic treponemes, as there has not been a diagnosis of yaws in the Artibonite Valley since the World Health Organization (WHO) treponemal eradication program in the 1950s.[8] The etiology of genital ulcer disease in Haiti has not yet been reliably determined. In other countries with reliable data, the percentage of GUD caused by syphilis varies between 10% and 40%.[9-11] If one assumes that 155 (25%) of the 620 GUD cases seen in the dispensaries were caused by syphilis, and adding the 30 confirmed cases of early syphilis at the hospital, the incidence of early syphilis in the HAS district in 1995 can be estimated at 185 per 200,000 or 92.5 per 100,000 individuals. There are few published incidence data from other developing countries, but the peak incidence in the United States was 66.6 per 100,000 in 1946, and the peak incidence in Singapore was 93.3 per 100,000 in 1955.[12,13] Clearly, syphilis is a problem affecting both urban and rural Haiti.

Syphilis causes significant morbidity and mortality in rural Haiti. The 33 cases of congenital syphilis in an area with 6000 annual live births represent a rate of 550 per 100,000 live births. As this was an institutional records-based study, and most children are delivered outside of the hospital, this number most likely underestimates the actual rate. In urban centers, rates of 700 per 100,000 have been found in Bangkok, and 850 per 100,000 in Lusaka.[9] The overall mortality from congenital syphilis was 17 per 33 (52%). There are no data on perinatal mortality in Haiti, but in rural Malawi, where the prevalence of syphilis among pregnant women was lower (3.5%), congenital syphilis accounted for 20 to 25% of perinatal deaths.[14,15] In Zambia, congenital syphilis was implicated in 20 to 30% of perinatal mortality.[16] In Zimbabwe, 20% of perinatal deaths were attributed to syphilis.[17]

The nine cases of tertiary syphilis observed in this study documented the morbidity of syphilis among adults. Reports of advanced meningovascular syphilis in HIV-infected individuals have raised concern that HAS would see a rise in the number of cases of neurosyphilis.[18] However, only one case of meningovascular syphilis in an HIV-infected individual was found in 1995. Either available diagnostic tests were inadequate to detect these cases or the initial fears about the effects of HIV upon the natural history of syphilis were overstated. The impact of syphilis on the natural history of HIV may be of more concern; several studies have shown that the presence of genital ulcer disease increases the transmission rate of HIV five- to sixfold.[19,20]

The current methods of detecting syphilis (i.e., self-referral for symptomatic disease, centralized serologic screening, and partner notification) have failed to contain the epidemic in this part of rural Haiti. Although a sizable number of people sought care for symptomatic disease, very few were women. In the dispensaries, the ratio of men to women seeking care for GUD was nearly six to one. In the hospital, only males sought care for primary syphilis. Given the high prevalence of women with

reactive syphilis serologies, it seems likely that women did not seek care for painless syphilitic ulcers. This observation was made in a recent study in rural Tanzania where the seroprevalence of syphilis was slightly higher in women than in men, but women reported symptoms less frequently.[21]

Whereas the centralized screening process detected a number of pregnant women with reactive syphilis serologies, only a fraction of these women received adequate therapy, and 41% received no treatment at all. The logistic complications of transporting blood samples, returning laboratory results, and scheduling follow-up treatment make centralized testing unsuitable for rural zones with limited infrastructure. In Jamaica, Zambia, and Kenya, researchers have found similar poor results with centralized testing strategies.[22–25] In Kenya, 91% of women with reactive syphilis serologies received no therapy at all.

Although partner notification is a classic control measure for syphilis, more syphilis cases were detected at HAS by contacting the parents of children born with syphilis than by contacting sexual partners. Several recent studies have examined the efficacy of partner notification.[26–28] These studies show that partner notification generates, on average, only 10 to 15% of STD cases, with an even lower proportion in socially and economically marginalized populations. These results can be improved if the notification is better adapted to the population served. A recent study in Cité Soleil, Haiti, showed that partner notification improved dramatically when the adverse effects of syphilis on the unborn child were stressed to partners of pregnant women; 42% of the partners were treated, mainly as a result of index referral.[30] More such research is needed on partner notification in socially marginalized populations in developing countries.

Having demonstrated that syphilis is a problem in rural Haiti causing significant morbidity and mortality, and that current control measures are not working, HAS has initiated new strategies to control syphilis. Clearly, prevention of primary syphilis is the ultimate goal. Hospital Albert Schweitzer has initiated epidemiologic studies to understand the economic and social issues that influence syphilis transmission in rural Haiti, and plans to apply this information to prevention strategies. Already the lessons learned in Cité Soleil are being applied; community based prevention programs are emphasizing the important relation between syphilis and fertility.

Mass treatment of vulnerable adult populations ("core groups") should be investigated. Recent evidence suggests that empirical treatment of high risk groups for syphilis may decrease the incidence of syphilis and, thereby, the transmission of HIV and that such a treatment strategy may be very cost-effective.[31] With an HIV seroprevalence of 3% in rural zones and 9% in urban zones,[32] controlling genital ulcer disease and syphilis might significantly reduce HIV transmission in Haiti. Epidemiologic studies to define core groups in rural Haiti are underway at HAS.

The eradication of congenital syphilis in Haiti is both possible and affordable. Several studies have demonstrated that maternal syphilis control programs are among the most cost-effective health interventions available.[22,33] In a demonstration program in Kenya, testing of pregnant women was decentralized to local health centers; this permitted initiation of syphilis therapy on the same day that positive test results were obtained.[19] With this program, treatment rates improved from 9% to 87%, and the cost (in 1995 US dollars) per case of congenital syphilis prevented was estimated at $50. A similar program in Zambia decreased adverse outcomes from syphilis by two thirds at a cost (in 1990 US dollars) per case of only $12. Recently, HAS started decentralized prenatal screening using RPR testing in each dispensary with same-day treatment, and community health workers are encouraging all pregnant women to seek prenatal testing. The projected cost (in 1996 US dollars) for each case of congenital syphilis averted is $55. Given the 52% mortality from congenital syphilis, this compares favorably with the price of childhood vaccination programs, which cost (in 1985 dollars) $100 to $200 per death averted.[34]

In conclusion, Haiti, with numerous health problems and limited resources, must prioritize public health goals based upon disease burden and cost-effectiveness of control measures. Syphilis control warrants a place near the top of the list.

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REFERENCES

1. Luger A. The origins of syphilis. Clinical and epidemiological considerations on the Columbian theory. Sex Transm Dis 1993; 20:110–117.
2. Farmer P. AIDS and accusation, Haiti and the geography of blame. Berkeley: University of California Press, 1992: 121–151.
3. Behets FM, Desormeaux J, Joseph D, et al. Control of sexually transmitted diseases in Haiti: results and implications of a baseline study among pregnant women living in Cité Soleil Shantytowns. J Infect Dis 1995; 172:764–771.
4. Holmes K. Sexually transmitted diseases. 2nd Ed. New York: McGraw Hill, 1990:213–263.

5. Zenker P. New case definition for congenital syphilis, (CDC). Sex Transm Dis 1991; 18:44-45.
6. Centers for Disease Control. Recommendations for the treatment and follow-up for syphilis. MMWR 1993; 42:27-46.
7. Olle-Goig JE, Rodes A, Barrera JM. Prevalence of HIV in a rural medical clinic in Haiti. J Trop Med Hyg 1993; 96:22-24.
8. Causse G, Maheuse A. La lutte contre les MST et les treponematoses endemiques. World Health Stat Q 1988; 41: 82-102.
9. Kaul R, Kimani J, Nagelkerke NJ, et al. Risk factors for GUD in Kenyan sex workers. Sex Transm Dis 1997; 24:387-392.
10. Morse SA, Trees DL, Htun Y, et al. Comparison of clinical diagnosis and standard laboratory and molecular methods for the diagnosis of GUD in Lesotho. J Infect Dis 1997; 175:583-589.
11. Kamya MR, Nsubuga P, Grant RM, Hellman N. The high prevalence of genital herpes among patients with GUD in Uganda. Sex Transm Dis 1995; 22:351-354.
12. De Schryver A, Meheus A. Epidemiology of sexually transmitted diseases: the global picture. Bull World Health Organ 1990; 68:639-654.
13. Lee CT, Thirumoorthy T. Epidemiology of syphilis in Singapore over three decades (1955-1986). Ann Acad Med Singapore 1987; 16:622-626.
14. McDermott J, Steketee R, Wirima J. Perinatal mortality in rural Malawi. Bull World Health Organ 1996; 74:165-171.
15. McDermott J, Steketee R, Larsen S, Wirima J. Syphilis-associated perinatal and infant mortality in rural Malawi. Bull World Health Organ 1993; 71:773-780.
16. Hira SK. Sexually transmitted diseases, a menace to mothers and children. World Health Forum 1986; 7:243-247.
17. Aiken C. The causes of perinatal morality in Bulawayo, Zimbabwe. Cent Afr J Med 1992; 38:263-280.
18. Johns DR, Tierney M, Felsenstein D. Alteration in the natural history of neurosyphilis by concurrent infection by HIV. N Engl J Med 1987; 316:1569-1572.
19. De Vincenzi I. A longitudinal study of HIV transmission by heterosexual partners. N Engl J Med 1994; 331:341-346.
20. Deschamps MM, Pape WJ, Hafner A, Johnson WD Jr. Heterosexual transmission of HIV in Haiti. Ann Intern Med 1996; 125:324-330.
21. Newell J, Senkoro K, Mosha F, et al. A population-based study of syphilis and sexually transmitted disease syndromes in northwestern Tanzania. Genitourin Med 1993; 69:421-426.
22. Behets FM, Brathwaite A, Bennett L, et al. Decentralization of syphilis screening for improved case management in Jamaican public clinics. Am J Public Health 1997; 87: 1019-1021.
23. Jenniskens F, Obwaka E, Kirisuah S, et al. Syphilis control in pregnancy: decentralization of screening facilities to primary care level, a demonstration project in Nairobi, Kenya. Int J Gynaecol Obstet 1995; 48(Suppl):S121-S128.
24. Mc-Caw Binns A, Greenwood R, Ashley D, Golding I. Medical conditions present during pregnancy and risk of perinatal death in Jamaica. Paediatr Perinat Epidemiol 1994; 8(Suppl 1):86-97.
25. Hira SK. Syphilis intervention in pregnancy: Zambian demonstration project. Genitourin Med 1990; 66:159-164.
26. Andrus JK. Partner notification: Can it control epidemic syphilis? Ann Intern Med 1990; 112:538-543.
27. Brandt AM. Sexually transmitted diseases: shadow on the land, revisited. Ann Intern Med 1990; 112:481-482.
28. Oxman AO. Partner notification for sexually transmitted diseases: an overview of the evidence. Can J Public Health 1994; 85(Suppl 1):S41-S46.
29. Oxman GL, Doyle L. A comparison of the case-finding effectiveness and average cost of screening and partner notification. Sex Transm Dis 1996; 23:51-57.
30. Desormeaux J, Behets F, Adrien M, et al. Introduction of partner referral and treatment for control of sexually transmitted diseases in a poor Haitian community. Int J STD AIDS 1996; 7:502-506.
31. Over M, Piot P. Human immunodeficiency virus infection and other sexually transmitted diseases in developing countries: public health importance and priorities for resource allocation. J Infect Dis 1996; 174 (Suppl 2):S162-S175.
32. Pape JW, Johnson WD Jr. AIDS in Haiti. Clin Infect Dis 1993; 17(Suppl 2):S341-S345.
33. Stray-Pederson B. Economic evaluation of maternal screening to prevent congenital syphilis. Sex Transm Dis 1983; 10:167-172.
34. Jamison DT, Mosley WH, Measham AR, Bobadilla JL. Disease priorities in developing countries. New York: Oxford Medical Publications, 1993:3-16.